

amendment. Notwithstanding the newly cited reference, claim 1, which is directed to the production of a glass substrate for a mask blank, remain patentable.

**Best**

**No EUV Mask in Best**

The Examiner asserts at page 2, line 3 from the bottom of the Office Action that Best et al disclose a process for fabricating a EUV mirror blank. Indeed, Best et al disclose a technique related to a EUV mirror blank for use in manufacturing a EUV mirror.

In marked contrast, the present invention relates to a technique related to a EUV mask blank for use in manufacturing an EUV mask. Best et al does not disclose a technique related to a EUV mask blank for use in manufacturing a EUV mask.

In particular, Best et al disclose, in Fig. 2, the EUV mirrors M1, M2, M3, and M4 which are used in an optical system or camera 6 (Fig. 1) of an EUVL (extreme ultra violet lithography) system shown in Fig. 1 (see paragraphs [0007] and [0006]). In marked contrast, the EUV mask manufactured by the use of the EUV mask blank according to the present invention does not correspond to the EUV mirrors M1, M2, M3, and M4. This difference is significant.

As illustrated in Fig. 2, the EUV mirrors M1, M2, M3, and M4 that are used in the camera 6 have curved surfaces. As illustrated in Fig. 4B, the thin plate 41 is “sagged” to the desired curved surface to produce a mirror blank 43 (see paragraph [0023] of Best et al).

On the other hand, as shown in Fig. 3A of the present application, the EUV mask blank (100) has a flat surface to produce the EUV mask (100a in Fig. 3B). There is no teaching or suggestion that the techniques applicable to producing a curved mirror substrate would have any application to a flat mask substrate.

**No Sagged Surface in Best**

The Examiner also asserts at page 3, lines 1-4 of the Office Action that Best et al disclose the expressly claimed steps:

“a ULE type glass is sagged to produce a glass blank.; and  
the top surface of the glass blank is then ground, and cmp polished to produce an  
extremely flat mirror surface.”

However, Best et al disclose in fact that “the thin plate 41 is sagged to the desired curved surface to produce a mirror blank 43, as illustrated in Fig. 4B (see paragraph [0023] of Best et

al). Thus, in Best et al, the top surface of the glass blank is neither ground nor cmp-polished and does not have the flat mirror surface but has the curved surface (see the mirrors M1, M2, M3, and M4 in Fig. 2). Clearly, the claimed step is not met, nor obvious from the teachings of a curved surface in Best et al.

No Pattern in Best

The Examiner also asserts at page 3, lines 5-7 of the Office Action that Best et al disclose the step:

“Multiple, and alternating layers of Mo, and Si are then deposited onto the top surface of the glass blank to produce an mirror with a pattern which can be used in the photolithographic patterning of a wafer.”.

However, the mirror never has a pattern which can be used in the photolithographic patterning of a wafer as known in the art.

No Method As a Whole is Taught

In sum, Best et al never disclose “said method producing, as said glass substrate, a glass substrate for an EUV (extreme ultra violet) mask blank and comprising said flatness control step, said acid treatment step, and said polishing step carried out in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank,” as recited in claim 1.

By contrast, Applicants teach the production of a glass substrate for an EUV mask blank by carrying out the flatness control step, the acid treatment step, and the polishing step in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank (see the description related to Example 1 of page 21, line 9 from the bottom through page 24, line 11 from the bottom of the instant specification; especially, the description of page 24, line 1 through page 24, line 11 from the bottom of the instant specification; and furthermore, see the description related to Example 2 of page 24, line 10 from the bottom through page 26, line 3 of the instant specification; especially, on the description of page 25, line 9 from the bottom through page 26, line 3 of the instant specification).

Claim 2

As to claim 2, Applicants similarly assert that Best et al never disclose “said method producing, as said glass substrate, a glass substrate for an EUV (extreme ultra violet) mask blank and comprising said flatness control step, said alkali treatment step, and said polishing step carried out in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank,” as recited in claim 2. By contrast, Applicants disclose how to produce a glass substrate for an EUV mask blank by carrying out the flatness control step, the alkali treatment step, and the polishing step in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank (see the description related to Example 5 of page 27, line 1 through page 27, line 7 from the bottom of the instant specification).

**Hata et al and Takeuchi et al**

The addition of Hata et al and Takeuchi et al does not remedy the deficiencies of Best et al.

Claim 1

Applicants respectfully submit that neither Hata et al (JP 63-114866) nor Takeuchi et al (2002/0179576) disclose “said method producing, as said glass substrate, a glass substrate for an EUV (extreme ultra violet) mask blank and comprising said flatness control step, said acid treatment step, and said polishing step carried out in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank,” as recited in claim 1. Thus, with the present invention, it is possible to produce a glass substrate for an EUV mask blank by carrying out the flatness control step, the acid treatment step, and the polishing step in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank.

Claim 2

Furthermore, Neither Hata et al (JP 63-114866) nor Takeuchi et al (2002/0179576) disclose “said method producing, as said glass substrate, a glass substrate for an EUV (extreme ultra violet) mask blank and comprising said flatness control step, said alkali treatment step, and said polishing step carried out in this order to thereby make the surface of the glass substrate

have a flatness and a surface roughness required to the glass substrate for the EUV mask blank” in claim 2. With the present invention, it is possible to produce a glass substrate for an EUV mask blank by carrying out the flatness control step, the alkali treatment step, and the polishing step in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank.

Claim 18

Likewise, none of Best et al, Hata et al (JP 63-114866), and Takeuchi et al (2002/0179576) ever discloses “said method producing, as said glass substrate, a glass substrate for an EUV (extreme ultra violet) mask blank and comprising said flatness control step, said acid or alkali treatment step, and said polishing step carried out in this order to thereby make the surface of the glass substrate have a flatness and a surface roughness required to the glass substrate for the EUV mask blank” in claim 18 of this invention.

In sum, Applicants respectfully submit that each of claims 1, 2, and 18 is patentable over the cited references taken alone or in combination.

Claims 3-5 and 7-24

Furthermore, Applicants respectfully submit that remaining claims are also patentable because they depend from the patentable claims 1, 2, and 18.

***Claim Objections***

The Examiner states that claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants are grateful to the Examiner for the indication of patentability, but in light of the clear patentability of the parent claim, no amendment is made.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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